

Claims

[c1] A welding apparatus for a welding process in a straight polarity configuration comprising:
a welding gun having means for feeding an electrode into the welding gun;
the electrode comprising a sheath encapsulating a core having a core composition, the core composition comprising a combination of graphite and one or more compounds of potassium, the combination of graphite and compounds of potassium in the core composition not exceeding approximately 5% by weight; and
a power source supplying electrical current to the electrode.

[c2] 2. The welding apparatus of Claim 1, further comprising a gas source supplying a shielding gas to the welding apparatus.

[c3] 3. The welding apparatus of Claim 1, wherein the welding process is gas metal arc welding.

[c4] 4. The welding apparatus of Claim 1, wherein the means for feeding the electrode into the welding gun comprise a wire drive and a wire reel.

[c5] 5. The welding apparatus of Claim 1, wherein one or more compounds of potassium comprise K_2MnTiO_4 and K_2SO_4 .

[c6] 6. The welding apparatus of Claim 5, wherein the combination is selected from the range from about 0.3% to about 5.0%.

[c7] 7. The welding apparatus of Claim 2, wherein the shielding gas comprises a mixture of Ar and CO_2 .

[c8] 8. A wire comprising a sheath encapsulating a core having a core composition, the core composition comprising a combination of graphite and one or more compounds of potassium, the combination of graphite and compounds of potassium in the core composition not exceeding approximately 5% by weight.

[c9] 9. The wire of Claim 8, wherein the compounds of potassium comprise K_2MnTiO_4 and K_2SO_4 .

[c10] 10. The wire of Claim 8, wherein the combination of graphite and one or more compounds of potassium in the core composition is selected from the range of about 0.3% to about 5% by weight.

[c11] 11. The wire of Claim 10, wherein the compounds of potassium comprise K_2MnTiO_4 and K_2SO_4 .

[c12] 12. A process of manufacturing a metal-cored wire comprising:
shaping a metal sheath into a fillable shape;
filling the sheath with a core composition to form a core, the core composition comprising a combination of graphite and one or more compounds of potassium, the combination not exceeding approximately 5% by weight; and
encapsulating the core by the sheath to form a metal-cored wire.

[c13] 13. The process of Claim 12, wherein the compounds of potassium comprise K_2MnTiO_4 and K_2SO_4 .

[c14] 14. The process of Claim 12, wherein the core composition is a powder.

[c15] 15. The process of Claim 12, wherein the combination is selected from a range of about 0.3% to about 5.0% by weight.

[c16] 16. The process of Claim 15, wherein the compounds of potassium comprise K_2MnTiO_4 and K_2SO_4 .

[c17] 17. A welding process in a straight polarity configuration comprising:
providing a welding apparatus having means for feeding an electrode into the welding apparatus and means for supplying a shielding gas into the welding apparatus;
coupling the welding apparatus to a power source in the straight polarity configuration and forming an arc;
feeding the electrode into the welding apparatus, the electrode comprising a sheath and a core having a core composition, the core composition comprising a combination of graphite and one or more compounds of potassium, the combination of graphite and compounds of potassium in the core composition not exceeding approximately 5% by weight; and

supplying the shielding gas into the welding apparatus to shield the electrode and the arc.

- [c18] 18. The welding process of Claim 17, wherein supplying the shielding gas into the welding apparatus comprises providing an external gas source.
- [c19] 19. The welding process of Claim 17, wherein feeding the electrode into the welding apparatus comprises providing means for feeding the electrode that is external to the welding apparatus.
- [c20] 20. The welding process of Claim 17, wherein supplying the shielding gas comprises providing a mixture of Ar and CO₂.
- [c21] 21. The welding process of Claim 17, wherein the welding process is a gas metal arc welding process.
- [c22] 22. The welding process of Claim 17, wherein one or more compounds of potassium comprise K₂MnTiO₄ and K₂SO₄.
- [c23] 23. The welding process of Claim 22, wherein the combination is selected from the range from about 0.3% to about 5.0%.